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The problem being addressed is the need for improved fish screen technology that is cost and performance effective and provides broad application to various hydraulic and biological conditions. In the past, it has been difficult to achieve fish exclusion objectives while handling fluctuating flow depths (e.g., tidal influences) or large debris loads. The need for this improved technology is nowhere more evident than in the Sacramento-San Joaquin Delta, California. Water exports from the delta impact the fishery resources, and as the future demand changes, the need for improved and innovative fish exclusion technology will be required. To compound the problem in the Delta, previously non-existent aquatic plants have greatly increased debris loads that must be handled at the larger fish screen facilities. Furthermore, the presence of non-native fisheries (e.g., Striped Bass and Mitten Crab) have increased stress on native species populations, primarily through predation. Thus, viable solutions to excluding fish from water diversions and protecting the resource must accommodate the excessive debris loads, while at the same time minimizing predation.

- Assist Reclamation managers, designers, water users, and the resource agencies through improvement of design and implementation guidelines for positive barrier screen technology with regard for the wide range of site specific conditions that exist.
- Improve application of positive barrier screen and louver technology through hydraulic laboratory and field investigations to identify potential design deficiencies and optimize performance under site specific conditions.
- Identify improvements to existing technology, and develop new technology for the advancement of the state of the art.
- Develop new technologies for providing effective fish exclusion while at the same time handling the large debris loads and diverse fishery inherent to the Sacramento-San Joaquin Delta, California.

Two cylindrical screens for diversions were tested this year: Pacific Ag Systems low velocity suction screens and the Sure-Flo self-cleaning strainer. Tests conducted to determine screen performance included measuring approach and sweeping velocity distributions and headloss through the screen. The test results from these screens as well as several screens previously tested will be used to determine which screens perform best for specific applications and will eventually be consolidated into an R-Series report.

In addition, on a related issue, a crab screen was developed for the Tracy Fish Collection Facility (TFCF). A traveling water screen manufactured by Farm Pump and Irrigation Company (FPI) was tested and modified in the Denver laboratory to make it effective for removing mitten crabs from the secondary channel while still providing a means for fish passage into the TFCF holding tanks. In addition, tests were conducted to determine the screen's performance in removing debris. These tests were very successful, and the final design was

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implemented into the screen installed at the TFCF in August. It is fully operational at this time and is performing well.

Two other related efforts this year were ER.99.29 – Hydraulic and Biological Evaluation of Static Inclined Screens for Fish Exclusion, and a cooperative agreement with Metro Wastewater Reclamation District – Denver, Colorado. These projects were focused specifically on developing new technology in the form of Coanda-effect screens. Prototype-size screens were tested in the hydraulics laboratory to determine hydraulic performance and their effectiveness for safe exclusion and downstream passage of fish. A computer model for predicting the hydraulic performance of custom designs was developed and will be documented in a future journal article. Biological tests are still ongoing and will be continued in FY 2000 under this research program, since ER.99.29 was only a 1-year program. Additional details of this work can be found in the executive summary for project ER.99.29.

California Department of Fish and Game
California Department of Water Resources
CALFED
Metro Wastewater Reclamation District - Denver, Colorado
U.S. Fish and Wildlife Service
National Marine Fisheries Service
U.S. Bureau of Reclamation:
Mid-Pacific Region
Northern California Area Office, Tracy Project Office
Tracy Fish Collection Facilities
Water Resources Research Laboratory
Ecological Research and Investigations

Hanna, Leslie J. February 1999. Traveling Water Screen Tests. PAP-801.

Hanna, Leslie J. March 1999. Pacific-Ag Systems Screen Tests. PAP-807.

Hanna, Leslie J. July 1999. Results from the Model Study of the Tracy Facility Crab Screen. PAP-815.

Hanna, Leslie J. September 1999. Sure-Flow Screen Tests. PAP-828.

Wahl, Tony L. Hydraulic Performance of Coanda-Effect Screens. Draft manuscript to be submitted to ASCE Journal of Hydraulic Engineering.